DOCUMENT RESUME

ED 123 150 SO 009 063

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TITLE The Relationship of Mastery Procedures and Aptitude to the Achievement and Retention of Transportation-Environmental Concepts by Seventh Grade Students.
PUB DATE Apr 76
NOTE 9p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, California, April 19-23, 1976); For a related documents, see SO 008 903

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Academic Achievement; *Academic Aptitude; *Educational Research; Effective Teaching; Geography Instruction; Grade 7; *Individualized Instruction; Learning Characteristics; Pacing; Secondary Education; Social Science Research; *Teaching Methods; Verbal Ability
IDENTIFIERS *Mastery Learning

ABSTRACT

This study examined the relationship between two independent variables, mastery and aptitude, on two dependent variables, achievement and retention. Aptitude was measured by administering the word meaning section of the Iowa Test of Basic Skills. Achievement and retention were measured by a researcher-constructed test. The study involved 17 seventh-grade social studies classes in Dallas, Texas. The students were taught an instructor-developed geography unit with either mastery or nonmastery procedures. The results indicated that the mastery treatment was not superior to the nonmastery treatment in either achievement or retention and that prior verbal ability proved to be the dominant factor in both achievement and retention. References and a listing of procedures followed by mastery and nonmastery groups in the experimental study are included. (Author/DB)

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Session # 15.23

THE RELATIONSHIP OF MASTERY PROCEDURES AND APTITUDE TO THE ACHIEVEMENT AND RETENTION OF TRANSPORTATION-ENVIRONMENTAL CONCEPTS BY SEVENTH GRADE STUDENTS

Presented at the annual meeting of the
American Educational Research Association
San Francisco, California
April 21, 1976

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SP009063

ABSTRACT

This study examined the relationship between two independent variables, treatment (mastery or non-mastery) and aptitude and two dependent variables, achievement and retention. Aptitude was measured by administering the word meaning section of the Iowa Test of Basic Skills. Achievement and retention were measured by a researcher-constructed test. The study was conducted using 17 seventh grade social studies classes.

The results of the study showed that the mastery treatment was not superior to the non-mastery treatment in either achievement or retention. Prior verbal ability proved to be the dominant factor in both achievement and retention. Using a stepwise multiple regression analysis, the correlation between verbal ability and achievement was .95. The correlation between verbal ability and retention was .89. These correlations were so high that it was not possible to make definitive statements about any remaining variables.

James S. Fagan AERA 1976

THE RELATIONSHIP OF MASTERY PROCEDURES AND APTITUDE TO THE ACHIEVEMENT AND RETENTION OF TRANSPORTATION-ENVIRONMENTAL CONCEPTS BY SEVENTH GRADE STUDENTS

Main Findings. The use of mastery learning procedures showed no superiority over non-mastery procedures in achievement or retention of concepts in the instructional unit, Transportation and the Environment. The correction/feedback procedures in the mastery classes were not sufficient to overcome differences in ability. Both achievement and retention correlated highly with verbal ability regardless of treatment.

Purpose. The purpose of this study was to compare the effects of two treatment variables, mastery and aptitude, on two outcome variables, achievement and retention, as measured by researcher-constructed tests. Mastery for this study was defined at an 80 percent criterion level. Aptitude was measured by administering the vocabulary subtest of the Iowa Test of Basic Skills: Level 13. Achievement and retention were measured by administering a researcher-constructed summative test covering the first five chapters of Transportation and the Environment. Both the mastery and non-mastery classes received the same instructional unit.

Treatment. The treatment variable in this study consisted of two teaching strategies. One was a mastery learning strategy and one was a non-mastery strategy. Each of the four participating teachers was randomly assigned to administer one of the two treatments. All of the classes taught by a teacher received the treatment assigned to that teacher. Eight classes received the mastery treatment while nine classes received the non-mastery treatment. In no cases in the experimental study was a teacher responsible for administering more than one treatment. The specific procedures followed by both treatment groups are summarized in table 1 of the Appendix.

The unit of treatment in the study was the intact class. This unit was selected because the treatment materials and procedures were designed for use in class-paced instruction.

The instructional unit in the study was the researcher-developed text Transportation and the Environment, written while the researcher was associated with the University of Georgia Geography Curriculum Project. The text uses a concept development approach. The key concepts for each chapter are identified at the beginning of the chapter in both a descriptive listing and in a schematic diagram. The narrative in the text is supplemented by pictures, charts, and maps. The unit was accompanied by chapter review sheets, chapter tests, and a summative test.

Population. The researcher arranged to conduct a pilot study prior to the experimental study. Arrangements were made with administrators in the Denton, Texas Independent School District to obtain four seventh grade social studies classes. All four classes were taught by one teacher. The pilot study was carried out over a 25-day instructional period in January and February of 1975.

The experimental study was conducted in the Dallas, Texas Independent School District. Seventeen classes and four teachers participated in the study. Since teacher participation in the study was on a voluntary basis, the 17 classes represented an available pool of students rather than a random sample. The experimental study was carried out over a 25-day instructional period in March and April of 1975.

Data Collection. The following data were collected:

1. Achievement was measured by a 40-item, four-foil multiple choice test. A reliability of .86 was computed according to the Cronbach Alpha Indices.
2. Retention was measured by administering the achievement test as a delayed posttest four weeks after concluding the study. A reliability of .86 was computed according to the Cronbach Alpha Indices.
3. Vocabulary level was measured by administering the 48-item, four-foil multiple choice word meaning section of the Iowa Test of Basic Skills:Level 13.

Unit of Statistical Analysis. The intact class was selected as the unit of statistical analysis in this study. In order to draw valid statistical conclusions, it is essential that the unit of treatment and the unit of statistical analysis be the same (Glass and Stanley, 1970). Since the materials used in the study were developed for use with class-paced instruction, the intact class was the unit of treatment. In order to be consistent, the intact class was also selected as the unit of statistical analysis.

Statistical Procedures. A stepwise multiple regression procedure was used to determine the relationship between the independent variables of treatment and aptitude and the dependent variable of achievement. An identical procedure was used to determine the relationship between the independent variables and retention. The computer program used in the data analyses was the BMD 02R (Biomedical Computer Programs, 1973).

Results. The analysis of the final achievement test showed a strong relationship between achievement and verbal aptitude as measured by the word meaning section of the Iowa Test of Basic Skills. There was also a strong relationship between retention as measured by the delayed posttest and verbal aptitude. Higher vocabulary level students consistently scored higher than lower vocabulary level students regardless of the treatment received. The correlations between vocabulary level and

achievement (r= approx. .95) and vocabulary level and retention (r= approx. .89) were so high that it was not possible to say anything definitive about the influence of the remaining variables of treatment and teacher.

Discussion. The results of this study indicate that in a short term study, mastery procedures as stipulated were not sufficient to overcome cumulative learning deficiencies. Both achievement and retention were a function of the verbal aptitude the students had at the beginning of the study. The results of this study are consistent with the results of other mastery learning studies in the social studies (Gaines,1971; Jones, 1974; Wyckoff, 1974; Contreras, 1975; Myers, 1975).

The instructional unit proved to be too difficult for some of the students who participated in the study. This appears to be primarily a function of low vocabulary and reading levels. The net result was that students who found the materials too difficult tended to become frustrated and lose interest. This situation could perhaps be alleviated by having a greater variety of activities and correctives.

The teachers participating in the study were able to relate many of the concepts and generalizations in the unit to state and local examples. This enhanced the meaning of the unit for the students and enabled them to better understand the concepts presented in the text. Unfortunately, time did not permit use of the optional activities in sections II and III of the unit, which involve application of transportation concepts to field experiences.

Conclusion. This study failed to show that the corrective/feedback component of the mastery procedures had any effect on achievement or retention. Rather, previous ability, as measured by a vocabulary subtest, proved to be the dominant factor.

Recommendations for Follow-Up Research. This study should be replicated and in so doing avoid some of the limitations of this study. Among the recommendations for future research are:

1. The study should be started at the beginning of the school year. This would make for an easier adjustment to the procedures.

2. A greater variety of corrective procedures should be used. Working only with the text and closely related materials causes some students to lose interest. The suggested optional activities might also be implemented.

3. The study should use eighth or ninth grade classes. This would be more in line with the reading difficulty of the treatment materials.

4. Mastery learning research in the social studies should be continued. However, in so doing, new and more powerful correctives need to be developed.

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Table 1

Procedures Followed by Mastery and Non-mastery Groups in the Experimental Study

	Mastery	Non-Mastery
1.	Advance Organizer - The teacher introduced the lesson by calling attention to the lesson model. Students were asked to verbally state the components of the model, i.e., chapter subtopics & concepts.	X
2.	The teacher went over the key concepts for the lesson with the students.	X
3.	The students read the lesson in class as they listened to the taped text. The teacher stopped the tape to discuss the contents with the students. Emphasis was given to the mastery of the key concepts for the lesson. Students were asked to verbally demonstrate concept mastery by using one of the following five concept variants. a) given the concept, define b) given the concept, provide an example c) given the definition, provide the concept d) given an example, provide the concept e) given an example, provide the definition	X
4.	The students completed the review sheet exercises. The teacher went over the review sheet with the students upon completion.	X
5.	The students took the formative test. Each item was keyed to the appropriate place in the pupil text by page number and paragraph.	X
6.	The teachers collected the papers and scored the formative test. The number of correct responses was put in the space provided on the test.	X
7.	The teachers returned the formative tests to the students. Students not achieving a score of 80% or higher were directed to go back and study appropriate portions of the text for any item missed. Students then wrote the correct answers on the formative test. Students who scored 80% or higher on the formative test were allowed to read a book or do work for another subject.	0

	Mastery	Non-Mastery
8.	The teacher drilled students who failed to achieve 80% mastery on the formative tests. The teacher called on individual students and elicited answers for each test item. Students who scored 80% or higher were allowed to read a book or do work for another subject.	0
9.	The teacher administered the formative test a second time to students not scoring 80% or higher on the first test. The teacher collected and scored the test. The number of correct responses was put in the appropriate space.	0
10.	The final summative test was administered upon completion of the first five chapters of the unit. All test items were multiple choice items and were written by using the formative test items as an item pool.	X
11.	The delayed posttest was administered four weeks after administration of the summative test. The delayed posttest was identical to the summative test.	X

X - indicates the procedure was used.

0 - indicates the procedure was not used.